# Genetics

The process of transfer of hereditry character from one generation to next generation is called Genetics. Johan Mendel is known as. father of genetics. Mendel experiments were based on cross breeding of two pea plant having contrasting characters for same feature i.e. tall and dwarf character of plant are for height of plant. He extended his work by two or three pair of contrasting characters called dihybrid and trihybrid cross. He concludes some result on the basis of his experiment called Mendel's law.

**1. Law of paired unit :** Mendel proposed that when two dissimila unit acto s are present in an individual only one is able to express. One that e esses self is dominant unit factor while other which fails to express is ec ssive it factor. For example tallness is dominant over dwarfness.

**2. Law of dominance :** Offspring of cross breed pa ent on show dominant characters in F1 generation.

**3. Law of segregation :** In F2 generation both the hara er which is governed by gene is separated.

**4. Law of independent assortment** During dihyb id and tribhybrid cross two or three pair of characters are taken. Th e characters segregate separately without depending on other in F enera on.

**Term related to genetics**

**1. Linkage :** Linkage is an exc ption of Mendel law. When two different gene are present on the ame chromosome their effects take place together insted of independently This henonm non is known as Linkage. The word linkage first coined y Mor an.

**2. Mutatio** A su en change in the gene which is heritable from one genera n to o her. The term Mutation was first coined by Hugo de Vries.

**3. Variatio :** When characters are transmitted from one generation to next generation ther is some change. Change in characters by recombination of gene in offsprin takes place they looks different from their parents. This phenomenon is known as Variation.

**4. Chromosomal aberrations :** Any change in chromosomal structure is known as Chromosomal aberrations.

**5. Cloning :** It is a process of producing many identical organism from a single cell having same genetic character as his mother. Ex : Sheep Dolly was produced from single cell.

**6. Totipotency :** It is the potential ability of a plant cell to grow into a complete plant.

**7. Pluriopotency :** It is the potential ability of a cell to develop any kind of the cell of animal body.

**8. Genetically modified organism (GMO) :** Manipulation of ge e by utting or joining the segment of DNA to get desired varieties of organism is call d genetically modified organism. This is also known as geneti ngin ring.

**9. Autosomes :** Chromosomes found in cell which a esponsi e for characters other than sex are called autosomes.

**10. Sex Chromosome :** The pair of chromosome w ich determine the sex of organism is called sex-chromosome. Human hav 23 pa of chromosome in which 22 pair are autosome and 1 pair is s x chrom some.

**11. Genome :** All gene present in a haploi cell is called genome.

**Sex Determination in Human**

In human male sex chrom s me is XY', where as in female sex chromosome is XX. During gamete formation in male h lf of the sperm contain 'X' chromosome while other half conta n Y Chr mosome. In female all gametes contain only one type of chromosom that is 'X' Thus when a male gamete i.e. sperm carrying 'X' chromosome fertiliz an ova, he zygote develop into female. When a sperm carrying 'Y' ch moso e ferti izes an egg, zygote develops into male.

Sometime ex mination is regulated by environmental factor. In some reptile temp ature determine the sex at which the fertilized egg is incubated.

In human e ch cell contains 46 chromosomes. Any addition or removal in the number of sex chromosome or autosome cause genetic disorder.

**1. Klinefelter Syndrome :** When a male have anextra X or Y chromosome in sex chromosome then the condition will be XXY or XYY instead of XY. The individual with this syndrome have masculine development but feminine development is not completely suppressed and the individual became sterile.

In female when extra X chromosome is present instead of XX they show normal development but limited fertility. Mental retardness is also seen in this type of syndrome. Number of chromosome became 47 instead of 46.

**2. Turner's Syndrome :** When female has single sex chromosome (X0) their ovaries are rudimentary, lack of secondary sexual character.

**3. Down's Syndrome :** When an extra chromosome is added to 21st autosomal chromosomes this lead to develop Down's syndrome. In this syndrome person became Mangolism. The person is mentally retarded, eyes protrud d an regular physical structure is present.

**4. Patau's Syndrome :** This type of syndrome is develop by n add ion of autosomal chromosome in 13th chromosome. There is a ut ma k in the lip and person is mentally retarded. Disease due to change in tical con tituent of chromosome.

**1. Sickle Cell Anaemia :** In this disorder erythrocytes destroyed more rapidly than normal leading to anaemia. These occu due o ch ge in 11th autosomal chromosome.

**2. Phenylketonuria :** It is an inborn e ror of etabo sm which result in mental retardation cause due to change in 1 h autosomal chromosomes.

**3. Haemophilia :** Gene esp nsibl for th disorder is linked with sex chromosomes. This disea ead to f ilure of blood clotting.

**4. Colour blindness** This dis der lead to failure to distinugished red & green colour. The gene re ponsible for t is disease is situated on sex chromosomes.